

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior revisions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A semiconductor device having a low electric field at the periphery of the device, the device comprising:

a first layer of semiconductor material of a first layer conductivity type,
the first layer of semiconductor material having first and second sides;

a second layer of semiconductor material of a second layer conductivity type, the second layer of semiconductor material having first and second sides with the first side of the first layer adjacent the second side of the second layer;
and

a single current localization region positioned in the first layer of semiconductor material and in the second layer of semiconductor material and adjacent to the first side of the first layer of semiconductor material, the current localization region extending beyond the first side of the first layer of semiconductor material into the second layer.

2. (Original) The semiconductor device as claimed in claim 1 wherein the first layer conductivity type and the second layer conductivity type are a same conductivity type.

3. (Original) The semiconductor device as claimed in claim 2 wherein the same conductivity type is N type.

4. (Original) The semiconductor device as claimed in claim 1 wherein the second layer of semiconductor varies in width, such that a central portion of the second layer of semiconductor is thinner than sides of the second layer of semiconductor.

5. (Currently Amended) The semiconductor device as claimed in claim [1] 6 wherein a distance in a central portion of the device from the current localization region to the third layer of semiconductor material is less than a distance from the first layer of semiconductor material to the third layer of semiconductor material at the edge of the device.

6. (Original) The semiconductor device as claimed in claim 1 further including a third layer of semiconductor material of a third layer conductivity type, the third layer of semiconductor material having first and second sides, wherein the first side is adjacent the second side of the second layer of semiconductor material.

7. (Original) The semiconductor device as claimed in claim 1 further including a first layer dopant and a current localization region dopant wherein the current localization region dopant diffuses faster than the first layer dopant.

8. (Original) The semiconductor device as claimed in claim 7 wherein the first layer dopant comprises arsenic, and the current localization dopant comprises phosphorus.

9. (Currently Amended) The semiconductor device as claimed in claim 7 wherein the first layer dopant comprises boron and ~~Cesium (CS-135)~~, and the current localization dopant comprises Cesium (CS-135) ~~phosphorus~~.

10. (Currently Amended) The semiconductor device as claimed in claim [1] 7 wherein the current localization dopant is substantially the same as the first layer dopant.

11. (Canceled).

12. (Canceled).

13. (Canceled).

14. (Canceled).

15. (Canceled).

16. (Canceled).

17. (Canceled).

18. (Canceled).

19. (Canceled).

20. (Canceled).

21. (New) A diode having a low device resistance and a low electric field at the periphery of the semiconductor device, comprising:

a first layer of semiconductor material of a first layer conductivity type, the first layer of semiconductor material having first and second sides;

a second layer of semiconductor material of a second layer conductivity type, the second layer of semiconductor material having first and second sides with the first side of the first layer adjacent the second side of the second layer, the second layer having a varying width such that a central portion of the second layer of semiconductor is thinner than sides of the second layer of semiconductor;

a single current localization region positioned in the first layer of semiconductor material and in the second layer of semiconductor material and adjacent to the first side of the first layer of semiconductor material, the current localization region extending beyond the first side of the first layer of semiconductor material into the second layer.

22. (New) The diode as claimed in claim 21 wherein the first layer conductivity type and the second layer conductivity type are a same conductivity type.

23. (New) The diode as claimed in claim 22 wherein the same conductivity type is N type.

24. (New) The diode as claimed in claim 21 further including a third layer of semiconductor material of a third layer conductivity type, the third layer of semiconductor material having first and second sides, wherein the first side is adjacent the second side of the second layer of semiconductor material

25. (New) The diode as claimed in claim 24 wherein a distance in a central portion of the device from the current localization region to the third layer of semiconductor material is less than a distance from the first layer of semiconductor material to the third layer of semiconductor material at the edge of the device.

26. (New) A semiconductor device having a low device resistance and a low electric field at the periphery of the semiconductor device, comprising:

- a first layer of semiconductor material of a first layer conductivity type, the first layer of semiconductor material having first and second sides;

- a second layer of semiconductor material of a second layer conductivity type, the second layer of semiconductor material having first and second sides with the first side of the first layer adjacent the second side of the second layer, the second layer having a varying width such that a central portion of the second layer of semiconductor is thinner than sides of the second layer of semiconductor;

- a single current localization region positioned in the first layer of semiconductor material and in the second layer of semiconductor material and adjacent to the first side of the first layer of semiconductor material, the current localization region extending beyond the first side of the first layer of semiconductor material into the second layer.